GÜNTHER
Heisskanaltechnik GmbH

DPK
User Manual
Software Version P 1.09 (and higher)

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Warranty Condtions:

1. **Installation and implementation must be carried out by an electrician!**

2. **Please refer to chapter 6 - Installation and Inplementation of the DPK user manual prior to the installion of the device!**

3. **Before connecting the device to the main power supply, check the main voltage and the type of net (star or delta)!**

1 General

The hot runner system DPK has been built and tested according to DIN 57411 part 1 and VDE 0411 part 1 (Germany). It has left the factory in perfect condition. In order to keep your product fully operational and to guarantee safe operation, please read this instruction manual carefully and follow all hints. Before switching on, it is important to check that the local voltage is identical to that allowed by the unit. The plug may only be plugged into to an earthed socket. Any disconnection of the earth cable (e.g. an extension of the cable without earth connected) can cause hazardous conditions to the unit.

Hint:
Disconnect mains before opening unit. Refer to a qualified technician for servicing.

The DPK unit is an optimized hot runner control unit, it is more efficient and reduces costs.

Advantages for the user:
- Available in 5, 10, or 15 hot runner versions according to the user's requirements.
- The DPK automatically recognizes low voltage nozzles and 230V hot runner elements and sets its control parameters accordingly.
- Only one unit is required for mixed operation .
- PID controller with variable parameters, fast heating of 5V and 24V low voltage nozzles, careful heating of 230V hot runner elements.
- Control operation is possible at all times even in the event of thermocouple failure.
- Existing power units from the 160 series can continue to be used as the DPK control unit is compatible with all existing GÜNTHER power units.
- Because of the module construction, system upgrades are possible.

The DPK is reliable and safe, due to continuous checking and monitoring functions.

Advantages for the user:
- Continuous self-monitoring function.
- Protects low voltage nozzles from current overload.
- Identifies thermocouple failures, heat circuit disconnections and short circuits.
- Turns off the power supply in case of a malfunction and signals the alarm via a potential free contact.
- Parameters and programs are saved in an EPROM and are therefore not lost in the case of a power supply failure.

The DPK is designed for easy use, this makes installation and tool change simple.

Advantages for the user:

- The DPK is especially designed for simple and easy operation.
- The multi-function keypad has an easy to use layout and because of its dust and water proof key pad, it withstands tough environments.
- The simple operator entry levels prevents wrong operation.
- All hot runners are simultaneously displayed and for each hot runner the set and actual values.
- The control parameters are adjustable according to the application.
- The implemented diagnostic tests the complete system, including tools, nozzles, distributors and the hot runner system for malfunction.
- Incorrectly connected circuits are located before start of operation.
- Low installation cost due to combined thermal and power connections.

The DPK has numerous special functions for optimal system utilization

Advantages for the user:

- Power output surveillance is possible during operation.
- Decrease and increase temperature for all control points by simply pressing a key.
- Reading of the effective current at low voltage.
- Several set value programs simplify material or tool change.
- If desired, a serial interface is available as connection to the injection molding machines.

2 Display and Operating Controls

The display and operating controls of the DPK are located on the operation control panel and the parallel display. Great emphasis has been placed upon ease of use and a good layout.

2.1 Control Panel
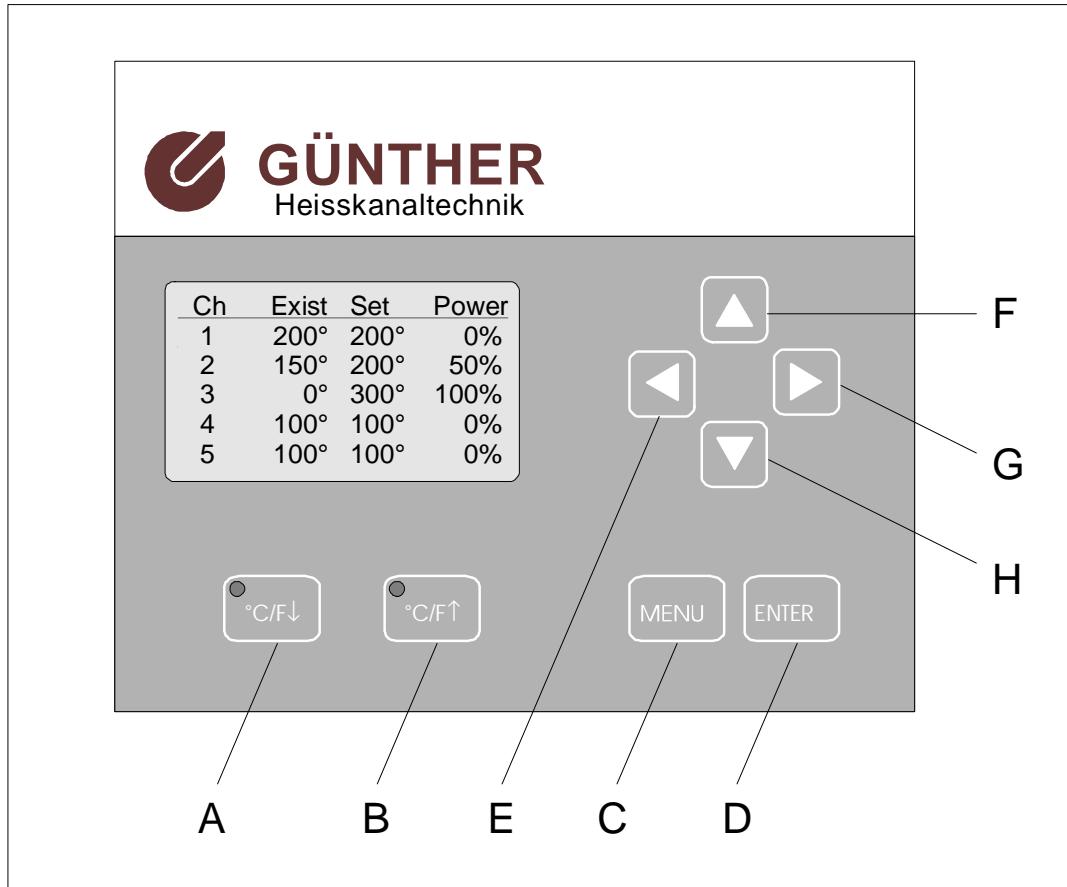
Fig. 2-1 control panel DPK

Function Keys

A Key „**°C/F↓**"	>	lowering temperature all zones	
B Key „**°C/F↑**"	>	raising temperature all zones	
C Key „MENU"	>	show menu	
E – H Keys „ ◀ ", „ ▶ ", „ ▲ ", „ ▼ "	>	changing & adjusting set values and parameters, cancel function	
D Key „ENTER"	>	´ENTER KEY´ to confirm inputs, to quit program levels	

Hint:
For further details concerning keys and their functions see chapter 3.3 Operation.

2.2 Parallel Display

The parallel display is a 15-fold 3-digit seven segment display for set temperature, actual temperature, temperature difference or actual adjustable variables in ´%´. Three additional LEDs are located beside each indicator to display the status of the zone.

If a channel is turned off, " --- " appears in the accompanying display. The percent control variable is displayed to channels which work in the setting mode.
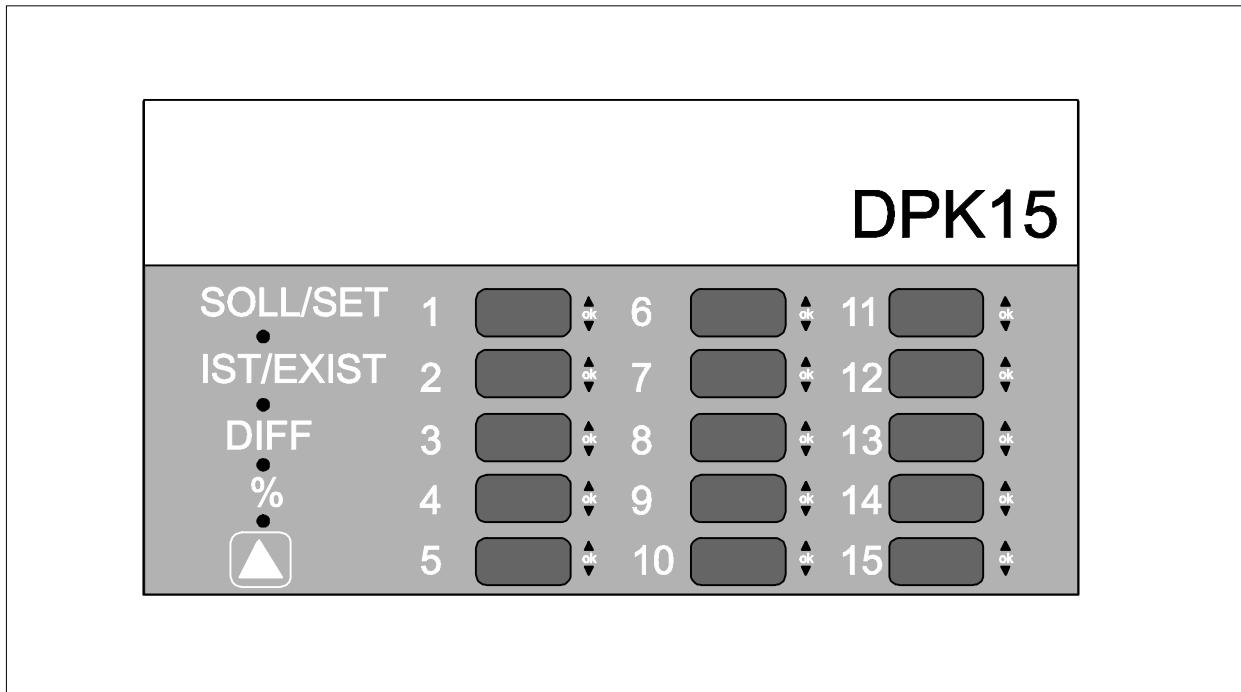
Fig. 2-2 parallel display DPK

Between the operating controls and parallel display the "▲" key and 4 LED´s are placed. The key is used to display the set value, actual value, temperature difference or the display of current in „%". The LEDs above the key shows the selected display type.

The temperature state in addition is one by one displayed for every channel. If the green indicator shines behind the corresponding value, this channel has reached the programed temperature window (ready for molding). There is an over and under indicator also which is a red indicator for both conditions.

3 Operating Instructions

3.1 Turning On

After the unit has been switched on the Günther logo, the program revision number and the serial Number will be shown on the display. Then the unit automatically performs a system check which includes the heating circuits, whether a low voltage or a 230 volt load is connected. After the system check the DPK detects the load if it is a low voltage or 230 V .The Display will show a table of all loads. If faults are detected on the system or the loads (nozzles, distributor or cables) the fault is displayed and the loads are switched off. At the same time the parallel display shows TST (Test) and then the detected voltage of the load. If a load turned of in reasen of a fault, or if it is not connected, the parallel Display will be shown „---".

3.2 Multi-Channel Mode

After the adjusting of the loads has been performed, the controller is in the multi-channel mode. In this mode every five channels are display for a short time interval.
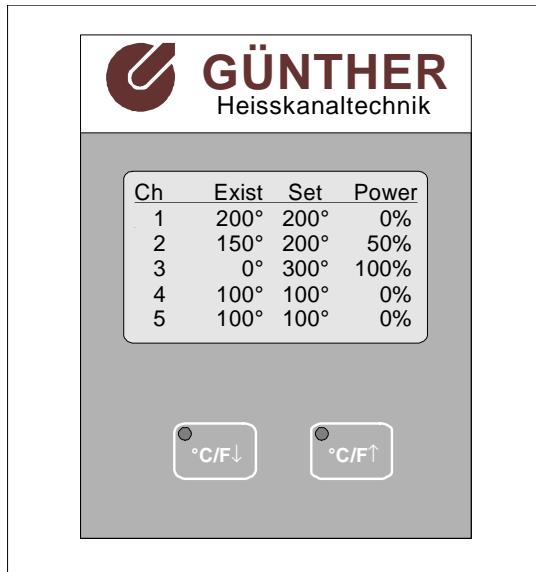
Fig. 3-1 Multi-Channel Mode

The set value and the current value in degrees celsius or degrees fahrenheit is displayed in this mode. The control value is also displayed in per cent (%) for 230V nozzles or in ampere (A) for 24V or 5V nozzles.

230V loads pass through a so-called softstart if the set temperature is higher than 105°C (221°F). If the softstart is active, all 230V loads are clamped to 105°C. This clamping ends if all loads have reached this temperature (see chapter **3.6.1 Softstart**).

Hint:
At the apperance of any failure the multi-channel mode will be interupted and the failure will be visualized on the display. If several errors occur, then the channel whose error was recognized first is displayed. This is also valid if the display is switched from the menu mode to the multi-channel mode after the apperance of any failure.

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3.3 Single Channel Mode

To change from the multi-channel mode to the single-channel, mark a channel with the keys marked „ ▲ " or „ ▼ ". By pressing the keys „ ▶ " or „Enter" the channel is entered in single-channel mode.
The single-channel mode is now shown on the display. In this mode all data (rated value, actual value, load caracter, current, power consumption) of each channel will be shown.
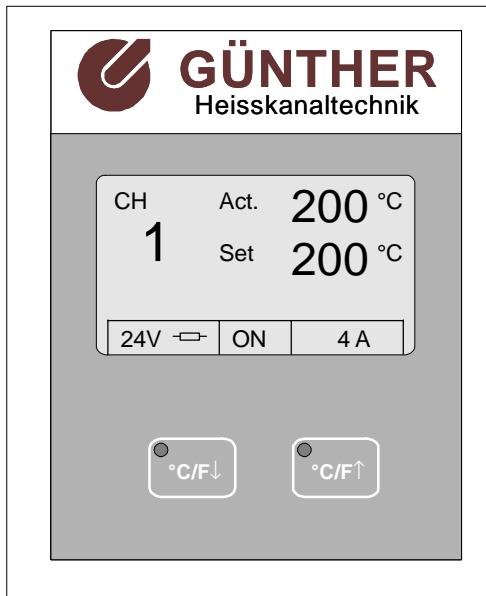
Fig. 3-2 Single channel Mode

At first, in the single-channel mode, the channel number is marked. By pressing the key „ ◀ " the display mode returns to the multi-channel mode.
Towards a cycle of 2 seconds the mark switched off, now it is possible by pressing the key „ ◀ " to turn the display mode to the scan mode.
The following sign indicates the scan mode.
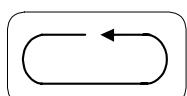
In this mode the zones with set and actual values will be displayed in the display, one by one.

Runners wich are switched of will be skipped.

The unit (%,A,°C,°F) for each zone number, will be displayed at the same time.
The scan mode ca be cancelled by pressing any key and restarted by pressing the „ ◀ " key after 2 seconds when the mark of the channel nummber swiched off again.

Hint:
If a fault occurs, the scan mode will be terminated and channel number causing a fault will be shown on the display. If several faults occur at the same time, the zone where the first fault occured is displayed.

3.4 Operating Mode

3.4.1 Changing Set Values

During the single-channel mode move the mark to the set value, by pressing the „ ▶ " key. The desired set value is entered by pressing the key „ ▲ " and „ ▼ ". The key function is dynamic i.e. the longer the key is pressed, the quicker the set point value changes.
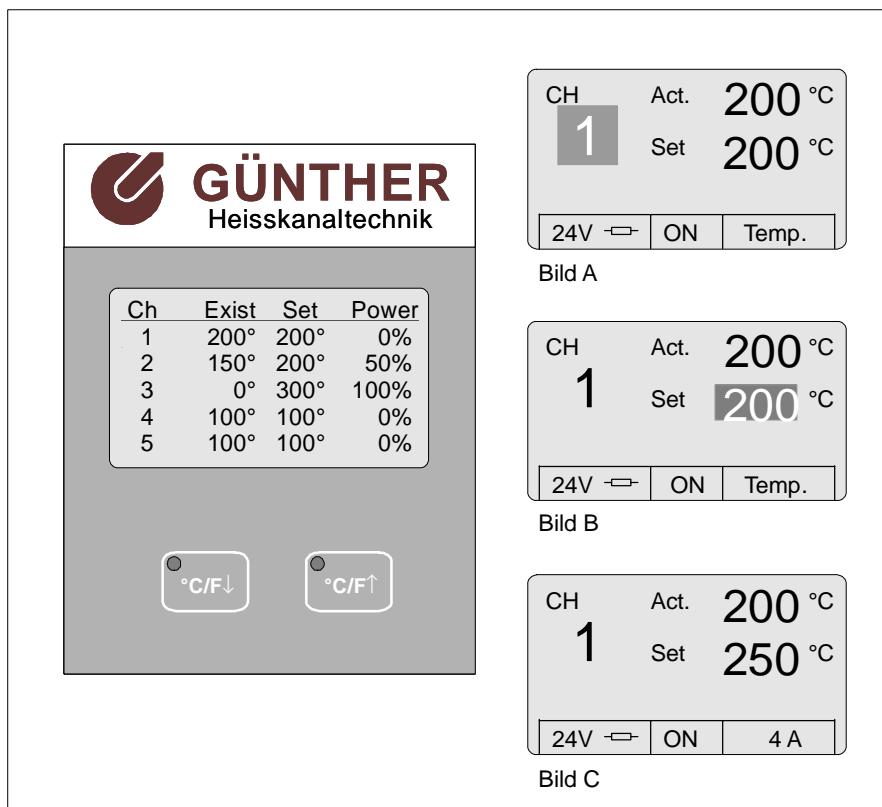
Fig. 3-3 Changing a Set Value

The controller operation works independently from the entering of a value. It is therefore not necessary to return to the scan mode. Scan mode makes exact surveillance of critical regulation positions possible.

Value limits: The temperatures are adjustable within a range from 0 to 500 °C
(0 to 932 °F).
The percentage control mode is adjustable from 0% to 100%.

3.4.2 Switching Hot Runners On and Off

If a hot runner is unused, it is posible to switch it off.
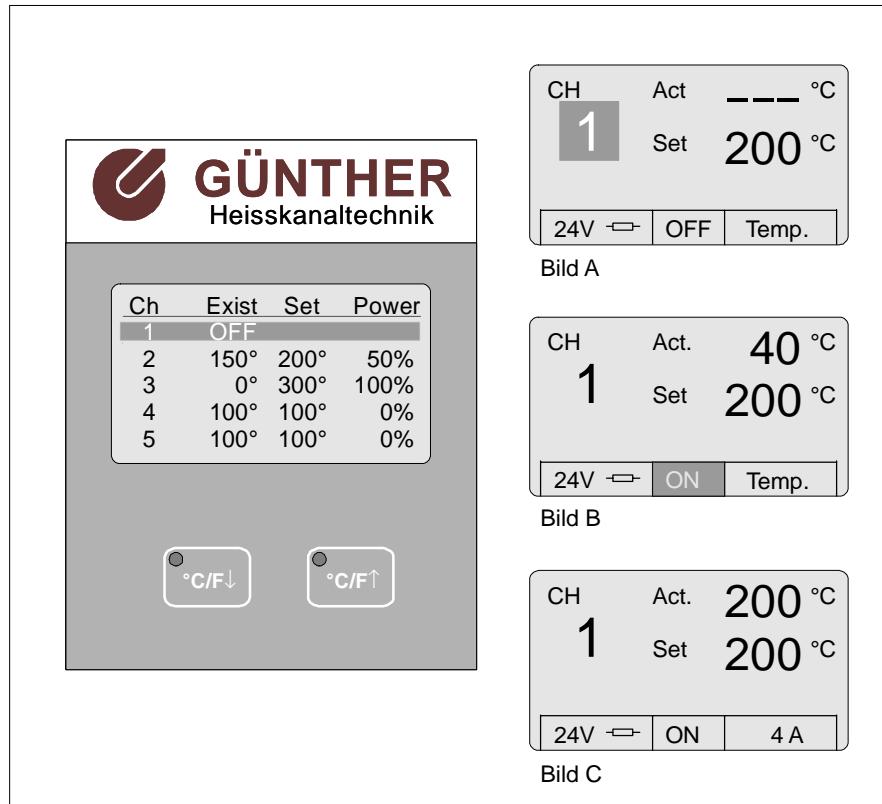
Fig. 3-4 Switching Hot Runners On and Off

During the single-channel mode move the mark to the ON/OFF button by pressing the „ ▶ “ key. Now the setting may be changed by pressing the „▲“ or „▼“ key.

Runners which are switched off will be displayed only in the multi-channel mode and are not checked for faults anymore.

3.4.3 Changing the Operating Mode „Thermocouple/Percentage"

In the event that a thermocouple fails to function, or for any other reason, the percentage control mode can be carried out to continue the control operation manually. The current will then be displayed in percent (%).

Mark the menu item power or temp. in single-channel mode by pressing the „ ▶ " key, choose between thermocouple or percentage by pressing the „ ▲ " or „ ▼ " key.
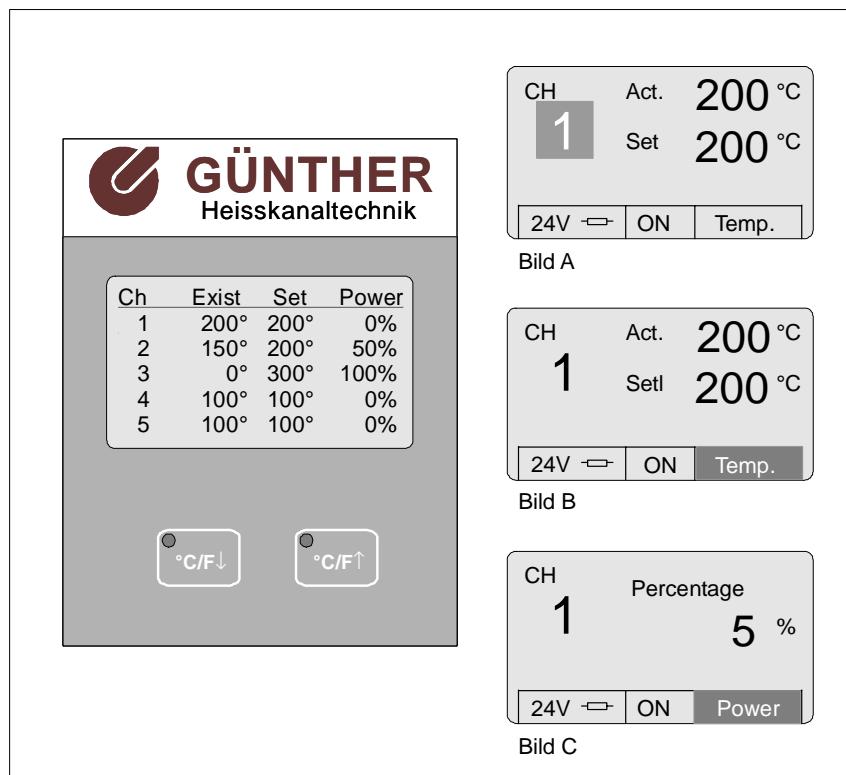
Fig. 3-5 Changing the Operating Mode

For low voltage-nozzles it will be: 100% approximately 125A (for   5V nozzles)
100% approximately 25A   (for 24V nozzles)

3.4.4 Temperature Lowering / Rising

If production stops for a longer period of time, it is advisable to lower the set temperatures without turning the unit off.

By pressing the key „**°C/F↓**" lowering temperature is activated. The display shows in the multi-channel mode at the left corner „t-lowering", in the single-channel mode the following sign.
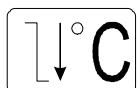
An external activation of the temperature lowering is possible by connecting a closing contact at the rear side of the DPK. It is possible to connect a potential free contact to the unit with a cable which is available from GÜNTHER HOT RUNNER SYSTEMS (specially for relay output of injection molding machines).

Additionally it is possible to increase the temperature for all runners at the same time. By pressing the key „**°C/F↑**" the temperature rise is activated. The display shows in the multi-channel mode at the left corner „t-boost", in the single-channel mode the following sign.
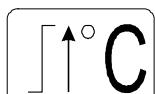
The temperature lowering mode is cancelled by pressing the key „°C/F↓" once more. Now the old set values are valid. The lowering value may be adjusted by the menu temp. lowering (in °C/°F, 0 - 255). The rise temperature mode is cancelled by pressing the key „°C/F↑". The rising value may be adjusted by the menu temp. boost. If the lowering or rising is cancelled, the old set values are restored.

3.5 Menu Mode

By pressing the „menu" key the menu mode is activated. The main menu will be shown on the display.

Fig. 3-6 Main Menu

Use the „▲ " und „▼ " keys to select and the A or „ENTER" key to confirm a menu item. If the operater does not makes modifications in the main or in a other menu the display mode will be changed after a time of 10 seconds and the display will show the single- or multi-channel mode.

If a menu item is confirmed, the value may be changed by pressing the „▲ " and „▼ " keys. By pressing the „◀ " oder „ENTER" key you will return to the menu. If the „ENTER" key is used the displayed value will be stored as a new set value. By using the „◀ " key the value will not be stored (cancel function).

The menu structure is on the next page.

Menustructure of the DPK

```
┌──────────────┐        ┌─────────────────────┐
│  Mainmenu    ├────┬───┤ set all channels    │
└──────────────┘    │   └─────────────────────┘
                    │
                    │   ┌─────────────────────┐
                    ├───┤ temp. program       │
                    │   └─────────────────────┘
                    │
                    │   ┌─────────────────────┐
                    ├───┤ temp. lowering      │
                    │   └─────────────────────┘
                    │
                    │   ┌─────────────────────┐
                    ├───┤ temp. boost         │
                    │   └─────────────────────┘
                    │
                    │   ┌─────────────────────┐
                    ├───┤ molding machine     │
                    │   └─────────────────────┘
                    │
                    │   ┌─────────────────────┐
                    ├───┤ power monitor       │
                    │   └─────────────────────┘
                    │
                    │   ┌─────────────────────┐
                    ├───┤ turn on time        │
                    │   └─────────────────────┘
                    │
                    │   ┌─────────────────────┐        ┌──────────────────────┐
                    ├───┤ configuration       ├────┬───┤ softstart            │
                    │   └─────────────────────┘    │   └──────────────────────┘
                    │                              │
                    │                              │   ┌──────────────────────┐
                    │                              ├───┤ load defaults        │
                    │                              │   └──────────────────────┘
                    │                              │
                    │                              │   ┌──────────────────────┐
                    │                              ├───┤ calibration          │
                    │                              │   └──────────────────────┘
                    │                              │
                    │                              │   ┌──────────────────────┐
                    │                              ├───┤ pid-parameter        │
                    │                              │   └──────────────────────┘
                    │                              │
                    │                              │   ┌──────────────────────┐
                    │                              ├───┤ switch °C/°F         │
                    │                              │   └──────────────────────┘
                    │                              │
                    │                              │   ┌──────────────────────┐
                    │                              └───┤ temperature window   │
                    │                                  └──────────────────────┘
                    │
                    │   ┌─────────────────────┐
                    ├───┤ heater 5V/24V       │
                    │   └─────────────────────┘
                    │
                    │   ┌─────────────────────┐
                    ├───┤ language            │
                    │   └─────────────────────┘
                    │
                    │   ┌─────────────────────┐
                    └───┤ service             │
                        └─────────────────────┘
```
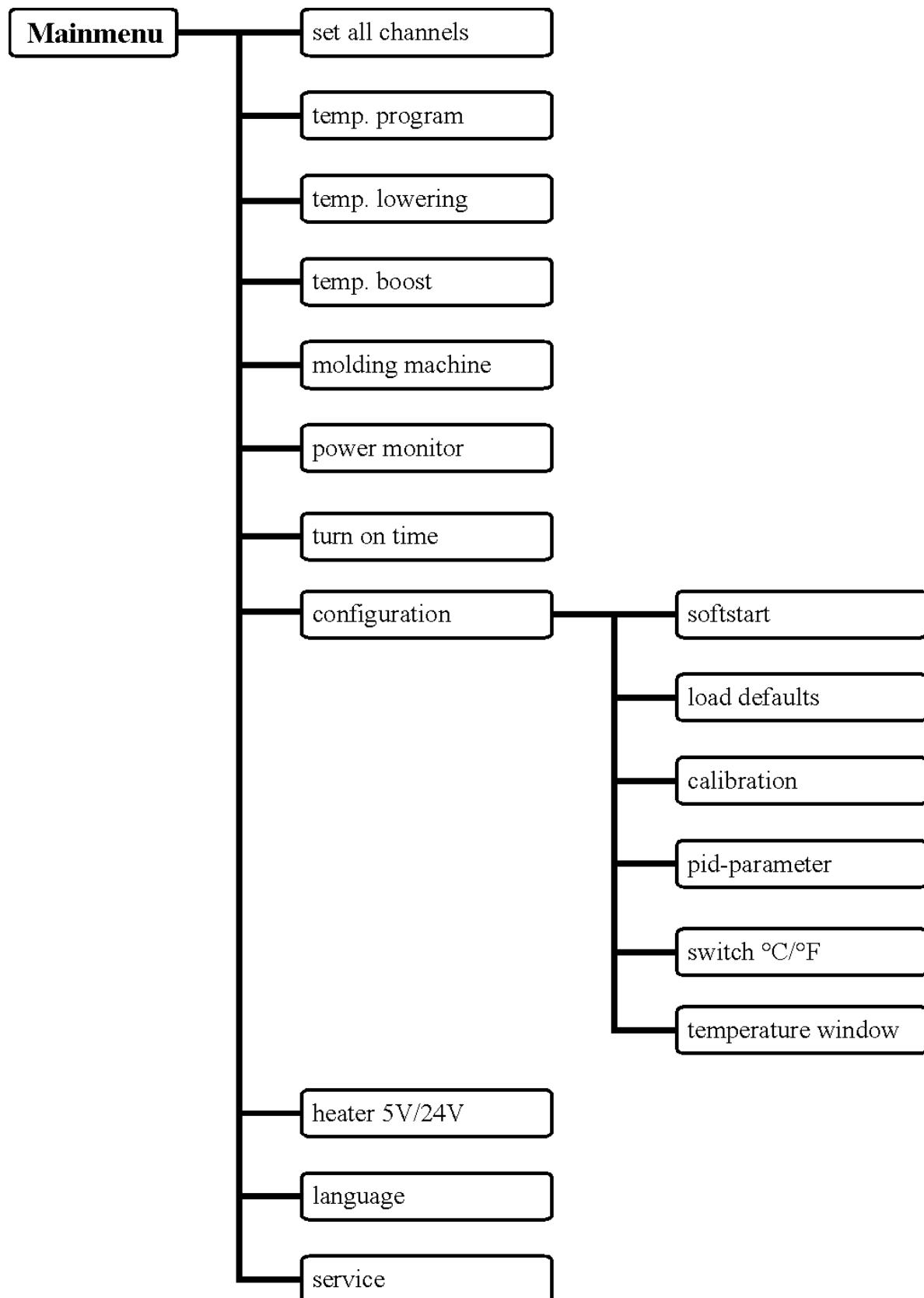
Fig. 3-7 Menu structure of the DPK

3.5.1 Set All Channels

The menu „set all channels" enables the operator to change the temperature, the controller output or to turn on or off all channel
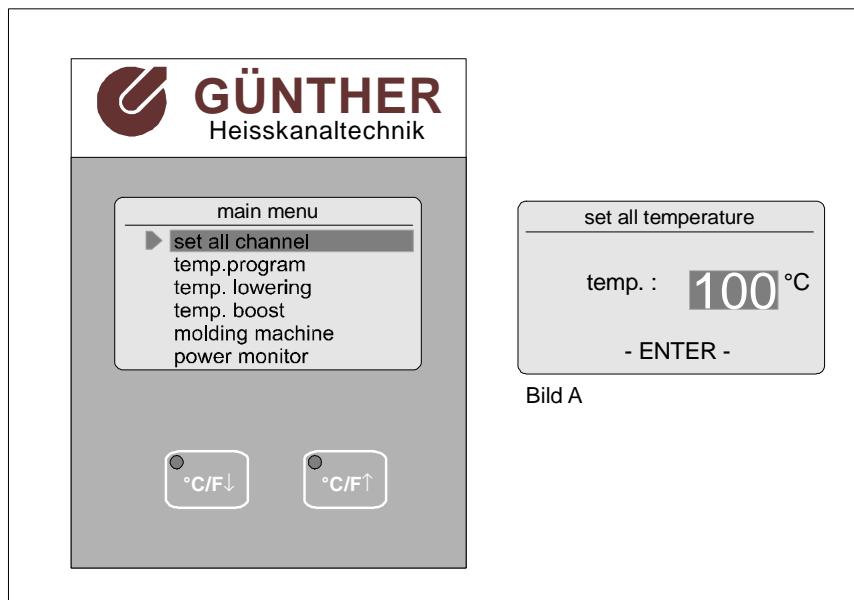

Fig. 3-8 Set All Channel

3.5.2 Temperature Program

A set value program is a preprogrammed series of set values and their corresponding operating methods which a user can change and enter into the system. They can be entered and activated solely by the menu „temp. program".

If the tools or the molding compounds are changed it is advisable to also change the program accordingly. There are 4 set values programs available. When the control unit is turned on, the last one of the previously used programs will be automatically reactivated.To reset all programs and all parameters select the menu item „default".
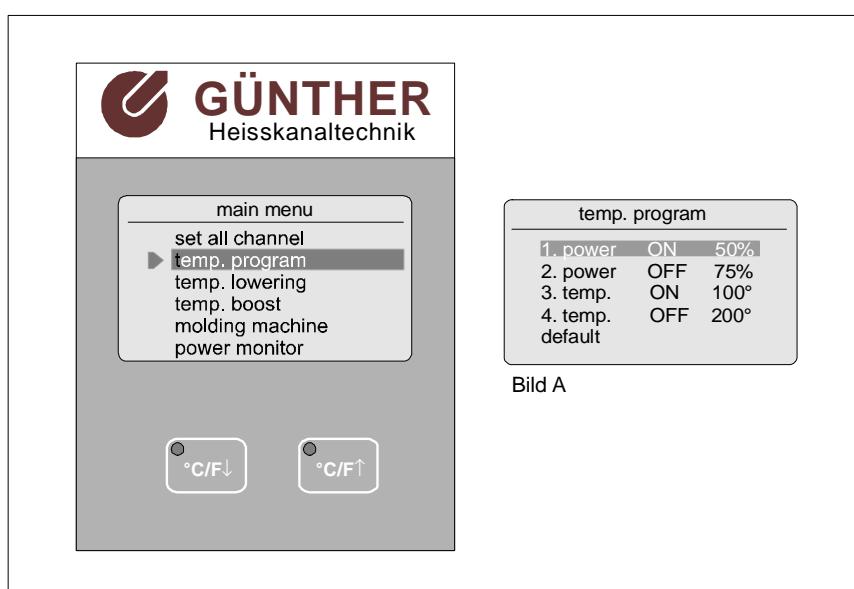

Fig. 3-9 Changing Temperature Program

3.5.3 Temperature Lowering/Rising

By the two menus „temp. lowering" and „temp. boost" the operator could set the increase or decrease temperature. By using the „°C/F↓" key the temperature drops about the value which adjusted in the menu „temp. lowering". By using the „°C/F↑" key the temperature rises about the value which adjusted in the menu „temp. boost".

3.5.4 Serial Interface

The DPK is generally delivered with one serial interface „COM1". This interface is a standard RS 232 interface. The serial interface „COM1" is only to connect a DPK to a personal computer or to comunicate with other DPK.

An optional serial interface „COM2" for injection molding machines is available. An add on Kit for delivered units is also available. With the interface „COM2" it is possible to remote control and display the information of the DPK unit via the injection moulding machine. The interface enables easy quality control because of the possible production data acquisition.

Because each injection moulding machine producer has ist own communication protocol, use the menu item „molding machine" to select the protocol of the molding machine

You can see which interface is needed by reading the user manual of the molding machine or contact Günther Hot Runner Systems for further information.

In the menu are the items Arburg, Engel und Kraus Maffei (see **Chapter 5 Interface**).

3.5.5 Power Monitor

The menu power monitor will show the total power consumption and the current separated for each line at the moment.
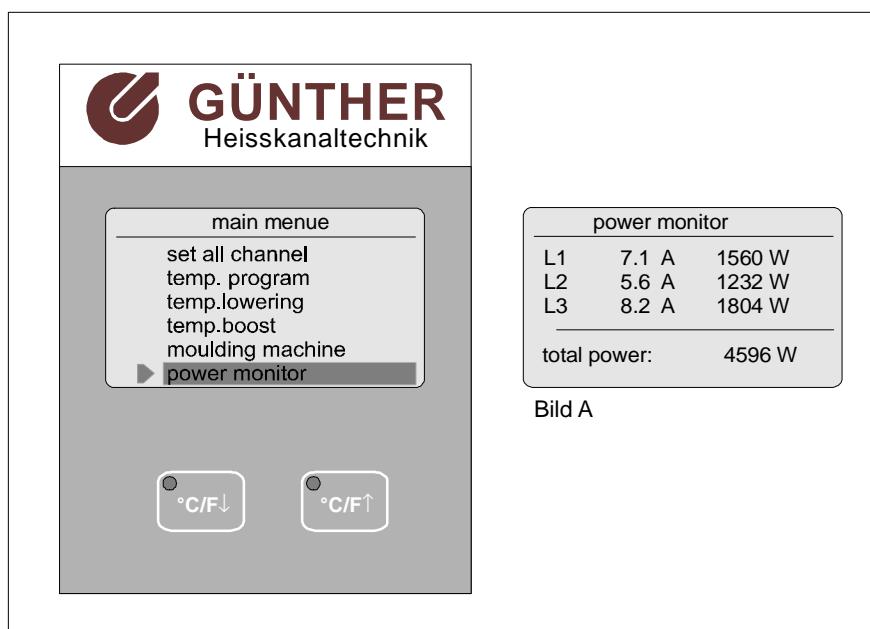

Fig. 3-10 Power Monitor

3.5.6 Turn On Time

The hours of operation are displayed in the menu turn on time. Every time when the DPK is switched on this time is incremented.

3.5.7 Configuration

By choosing the menu item configuration the configuration menu will be entered. You need a password to enter this menu. In the configuration menu the operater can change the language, the PID parameter or calibrate the DPK etc.
For further information refer to Chapter 3.6 Configurationmenu.

3.5.8 Heater 5V/24V

In this menu item the type of the low voltage load (5V/24V) for all channels can be set. This means the DPK is able to work in a mixed mode with 230V and 5V nozzles or in a mixed mode with 230V and 24V nozzles. A mixed mode for 5V and 24V nozzles is not supported!

3.5.9 Language

In this menu item you are able to change the language for the display and the menu. The DPK supports three languages: german, english and french.

3.5.10 Service

This menu item is used by the manufacturer of the DPK for several setting. This menu has ist own password. The user must not and need not make any changes to this menu.

3.6 Configuration Menu

By scrolling through the main menu, the configuration menu can be entered. A password is needed to enter this menu. In the configuration menu the operater can change the PID parameter or calibrate the DPK etc.

The password for the configuratin menu is: **0099**

The entered password is only valid for 15 minutes or up to the moment where the DPK is turned off. For further changes to the configuration you need to enter it again.
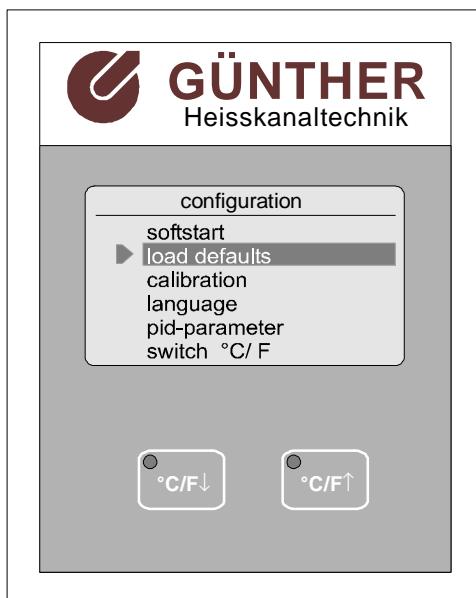

Fig. 3-11 Configuration

3.6.1 Softstart

When 230V nozzles are used it is necessary to employ the softstart start-up procedure to dry out the moisture that has collected in the heating elements. In order to do this, in the first phase of the softstart (the set time) value of the menu softstart is increased from 0 to 50% . The ramp time should be selected in such a manner, that the DPK reaches the temperature of 105°C at the end of the ramp. If the temperature is less than 105°C at the end of the ramp, the DPK will increase the temperature to 105°C. After the DPK has reached the 105°C the second time controlled phase of the softstart (the holdtime) begins. The ramp and the hold time is adjustable by the menu softstart and could be changed in 2 seconds steps. The holdtime is used to adequately dry out the nozzle with a low thermic load. This start-up operation will begin automatically if it´s been activated in the softstart menu after the control unit or runner is switched on and also after a program change. The softstart start-up procedure is activated individually and automatically for each zone when the actual temperature of a 230V nozzle remains below 100°C, because the set value is programmed over 100°C. The softstart is indicated in the single channel mode by the following sign.

ramp time   hold time

In the multi channel mode by the text „softstart" and the countdown in the left corner.

After the end of the holdtime the unit will switch from softstart to normal operating mode. To prevent overheating of the molding material in the 5V nozzles during combined operations employing both 5V and 230V nozzles, the 5V nozzles are limited to temperatures not exceeding

105°C during softstart. The temperature lowering is taken into consideration during softstarts, so that the DPK unit can begin to operate immediately with an instant temperature lowering.

3.6.2 Load Defaults

By selecting the menu item load defaults and affirming the questions with yes twice, the DPK loads up the parameters and values to the factory settings.

Attention!
All individual entered settings of the DPK (values and parameters) will be deleted!

The following table shows the default settings:

Set All Channels:
(all set temperatures)   100°C

Temperature Programs:

1. power	ON	50%
2. power	OFF	75%
3. temp.	ON	100°C
4. temp.	OFF	200°C

Softstart: ON

over all time:	10min
hold time:	5min
ramp time:	5min

PID-Parameter:
(for all channels)

P-Value:	60
I- Value:	60
D- Value:	30

Temperature Unit: °C

Temperature Window: +/- 5°C

Lowering Value: 50°C

Rising Value: 50°C

Language: German

Interface: Arburg

Heater 5V/24V: 24V

3.6.3 Calibration

The sophisticated and microcontroller seconded temperature module of the DPK could calibrate its self by using a calibrationjack.
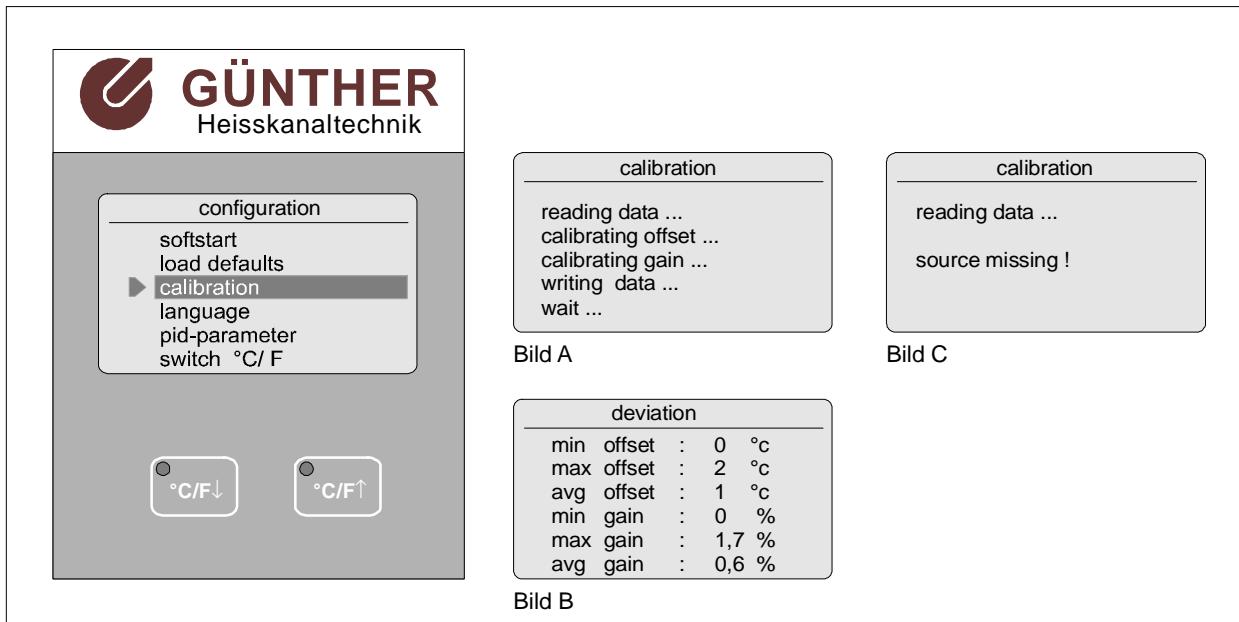
*Fig. 3-12 Calibration*

The calibriation jack is available from GÜNTHER HOT RUNNER SYSTEMS, without the jack the error message of Fig. C will be shown on the display.

3.6.4 PID - Parameter

The operater can change the PID parameter using the menu item „pid-parameter". So the operator is able to match the parameter to the controlled system. It is possible to match the paramters independently.

3.6.5 Switching °C / F

By choosing the menu item „switch °C/F" it is possible to choose between degrees celsius or fahrenheit.
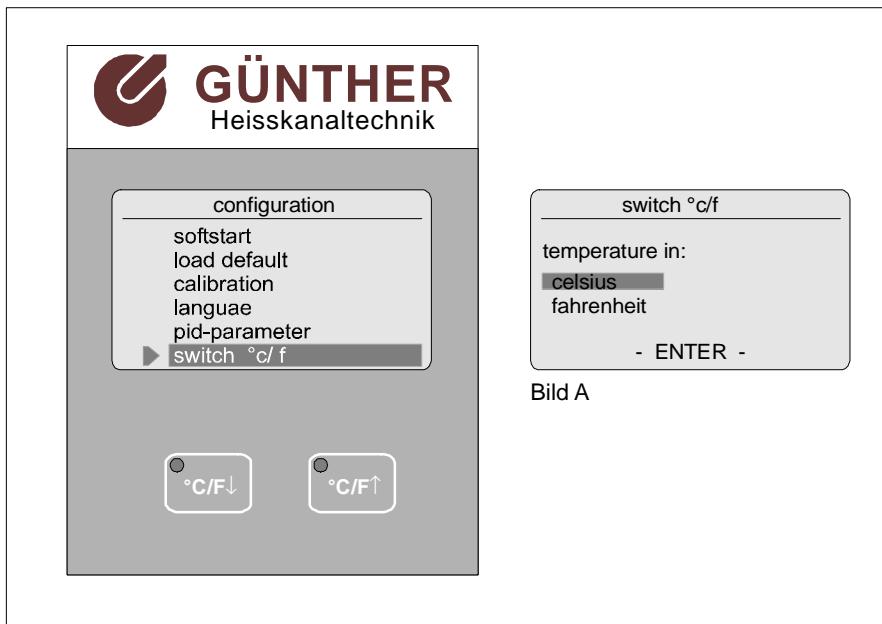
*Fig. 3-13 Switching °C/°F*

3.6.6 Temperature Window

The width of the windows for the value of the existing temperature can be changed in the menu item temperature window. Is the value of the temperature at the nozzle within this window, this will cause the lightning of the O.K. indicator in the parallel display. If all temperatures are in within the window, the ready to mold output will be set.

4 Other Functions

4.1 Ready to Start Molding

As soon as the adjusted runners have reached the preset temperatures the OK LED is switched on and in the bottom line of the display appears the text „ready for molding". Additionally a potential free relay contact is switch on. This relay contact is located on the rear side of the system and is marked with OK.

The OK LED and the relay output will be switched off in case of:
- a fault
- lowering

4.2 Error Messages

In the event of a fault, the display will show the fault and the protection system will shut down the power. With this fault the relay contact is switched. By pressing the „ENTER" key the faulty channel will be switched off and the other channels will be switched on.
During the hot runner test all channels without a fault switched on and so it is not a mistake it is only a warning that the faulty channel is switched off.
A channel which evoked a warning is switched in the off temperature mode when no load is detected and switched in the off percentage mode when no thermocouple is detected.

The following faults are possible.

Thermocouple Failure
The thermocouple of the shown channel was not found. Please check the thermocouple and its` wires.

Fig. 4-1 Thermocouple Failure

Fig. 4-2 Thermocouple Exchange

Thermocouple Exchange

The thermocouple of the shown channel is not connected right. The + and – connections are exchanged. Please change the direction of the connections.

Fig. 4-3 Thermocouple Shortcut

Thermocouple Shortcut

There is a short circuit at the thermocouple or its connections at the shown channel. Please check the thermocouple and its` wires.
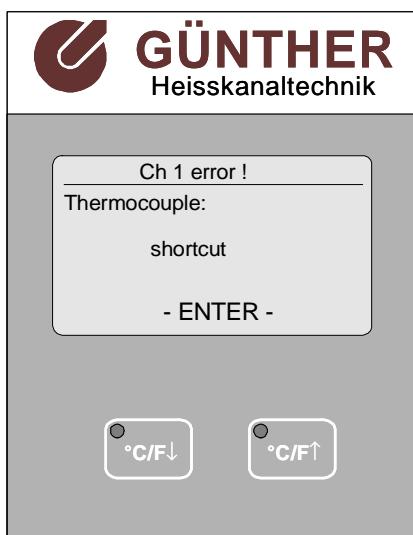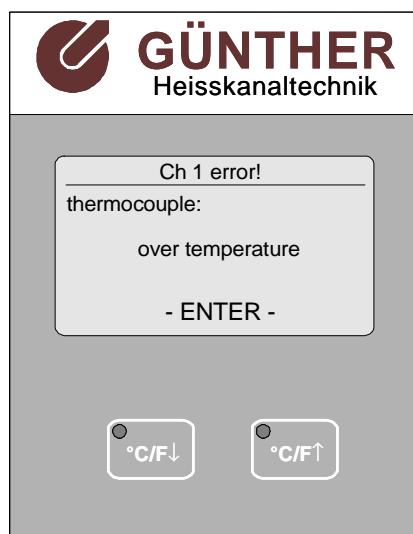
Fig. 4-4 Over Temperature

Over Temperature

The thermocouple of the shown channel detects a temperature above 500°C. Please check this thermocouple and its` wires. You should also check the thermocouples for neighboring nozzles.
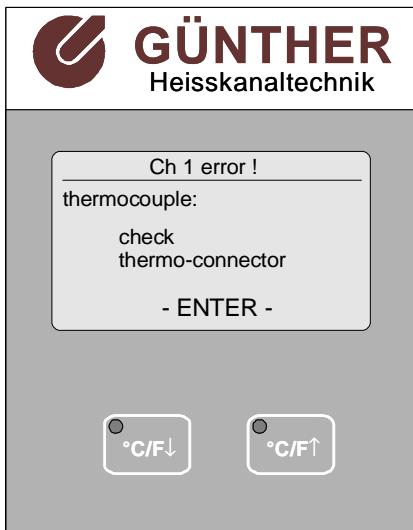
Fig. 4-5 Check Thermo-connector

Check Thermo-connector

The connector of the thermocouple at the shown channel is missing or is not fixed. Please check the connections.

Fig. 4-6 Load Interrupted

Load Interrupted

The wires to the power module or to the nozzle of the shown channel are interrupted. Please check the load fuses and the wires.

In normal operation the load interruption is only detected at a percetage value of 100%. This error message can occup at the adjustage. In this case, the power of the nozzle could be to small for this application.

Fig. 4-7 Load Connector Failure

Load Connector Failure

The load connector is lost or not fixed. Please check the connector.

Fig. 4-8 Plausibility Error

Plausibility Error

The arrangement of the loads referring to the channel number is not the normal order. The low voltage nozzles should be connected to the low channel numbers. 230V nozzles should be to the higher channels after them.

The parallel display shows the types of nozzles after the adjustment.

If this order is chosen intentionally the opperation can go on after confirming this warning.

Fig. 4-9 Damage of a Power Module

Damage of a Power Module

Befoer the adjustment a damaged triac was found on one of the power modules. Every off the max three power modules is driven by one phase. So the damaged module can be found easy by disconntion the modules one by one.

Please change the damaged module by an electrcian or contact Günther Hot Runner Systems.

Please disconnect the line voltage before oppening the case! Pay attention to the safety instructions!

4.3 Starting Ramp

In hot runner systems you will often find loads with different thermic time constants. If the time constants differ widely, then a fast nozzle reaches its set value earlier than the slow manifold. This physically based heat-up delay can generate plastic defects in the nozzle, because it reaches the set value much earlier then the other nozzles. The starting mechanism ensures an even set value based heat on all of the different nozzles. The individual nozzle will be decoupled from the leading mechanism if the slowest channel reached the temperature window.

The starting ramp is indicated in the multi channel mode by a short text wich gives an information about the slowest channel and that the starting ramp is activated in the bottom line on the display and in the single channel mode by the following symbol.
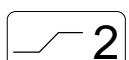
The number behind the sign is the number of the slowest channel.

5 Serial Interface

5.1 General Information

The DPK is equipped with one serial interface „COM1" (see also **chapter 3.5.4 Serial Interface**). This is a standardized RS232 interface.

An optional serial interface „COM2" is available. An add on kit is also available. This second serial interface is used for a connection to a molding machine. With the interface „COM2" it is possible to remote control and display the information of the DPK unit via the molding machine. It enables easy quality control caused of a product data aqusition. This time there a serveral types of serial interface available. Depending on the molding machine a RS232, a RS485 or a TTY interface is deliverable.

Which interface is needed for your molding machine is described in the user manul of your machine. For further information please contact Günther Hot Runner Systems.
Caused of several communication protocols for the different molding machines contact Günther Hot Runner Systems for availability. (Please specify the type and manufacturer of your molding machine).

Please refer the installation instructions for detailed information of installation.

The DPK with an optional serial interface gets all data from the molding machine. Operation on the hot runner system is not necessary and for security reasons not possible. Parmeter and set temperature changes are impossible if the DPK is connected to a molding machine. This means especially the set values, the change all channels function, the temperature programs and the setting for temperature lowering and boost. A temperature lowering or rising is also not possible.

Hint:
If for example Parameters should be changed, the connection from the DPK to the molding machine must be opened. (Disconnect the cable to the molding machine after switching off the DPK or switch off the molding machine). This causes no more data to be sent to the DPK. Then the DPK notes that no interface operation is current. In this case the DPK enables any user opperations after a few seconds. The DPK then works as a stand alone unit. The parameters and setting from the molding machine are stored in the DPK. This increases easy diagnostics to the hot runner system.

For the opperation hints for the interface of the different molding machines please refer your use manual.

The following interface paramters are set if a protocol type is changed:

Type	Interface Type	Parameters
Arburg	TTY 20mA	4800 Bit/s 8E1
Engels	TTY 20mA	4800 Bit/s 7E1
Krauss-Maffei	V24 / RS232	9600 Bit/s 7E2
Mannesmann-Demag	TTY 20mA	4800 Bit/s 8N1

5.2 Trouble Shooting

Hint:
For faults that are not associated with the interface connection, the DPK should be disconnected from the molding machine.

There are several red and green LEDs inside the DPK. You can watch them after opening the case. The LEDs for the connection to the molding machine are located on the display circuit (front panel). The two other LEDs on the module LR 28 are for the internal communication between the operator/display panel and the regulator module.

By flickering the LEDs indicate that a data flow is current.

green / RXD   Input DPK

> Flickering indicates: The DPK gets data from the molding machine.

red / TXD   Output DPK

> Flickering indicates: The DPK sends data.

Hint:
If the DPK detects any failure, the loads will be disconnected from the power line. This error state is displayed on the DPK. If the channel which caused this error is switched off, the error state is confirmed. After that the other channels are switched on again.

Your can get further information in **chapter 4.2 Error Messages** and **6.2 Initial Start-Up.**

6 Installation and Start-Up

6.1 Installation

6.1.1 Location

The absolute dimensions of the DPK are specified in **appendix D**. Pay attention to guarantee a sufficient air circulation behind the DPK regulator unit (heat sinks). Ensure sufficient air circulation at the bottom of the DPK is supplied by an installed fan. The system must be set up on a stable and level area. The DPK must be preserved from physical shock and vibration. For the maximum operating temperature please refer to **appendix D**. Please take care of the other operating conditions listed in apendix D. Protect the DPK from dust and dirt. When the device is assembled, for example in a service cabinet, a cable inlet of 120 x 90 mm should be provided.

6.1.2 Electrical Connections

The following electrical connections are required for installation:

DPK:

(Three phase CEE 32A plug) Phasedistribution:			
DPK 5	L1	Fuse 25A	L2, L3 not connected
DPK 10	L1, L2	Fuse 25A	L3 not connected
DPK 15	L1, L2, L3	Fuse 25A	

Hint:
Please check mains voltage (star/delta) prior to installation. Star is the standard configuration of the delivered unit. Delta is possible if the voltage between two phases is not higher than 200-250V. (Please refer to apendix C).

Thermocouple Cables

The thermocouple cable requires a 32 pin (2 x 16 pins) socket with a suitable housing. The cable assignment is listed in apendix A. Parts and preassembled, prewired thermocable systems will be supplied from Güther Hot Runner Systems.

Power Cables

The power cable requires a 40 pin connector plug with a suitable housing. Because of the large number of possible arrangements and the required special crimping tools, preassembled power cables manufactured by the GÜNTHER HOT RUNNER SYSTEMS should be used.
In order to maintain a standard and for compatibility reasons the following procedures should be followed:
If a combination of low voltage and 230V runners is employed, the low voltage runners should be connected in a sequential arrangement of increasing voltages, beginning with runner 1. After all low voltage runners have been connected, the 230V runners should then be connected to the system. For example in a 10 runner system, runners 1 to 4 are low voltage types and runners 5 to 10 are operated at 230V. The length of the power cable should not exceed 3 meters.

The following standard plug connections are avalible:

Low Voltage:

- 20 pin for power components type DL 4
- 39 pin for power components type DL 6 and DL 8
- 40 pin for power components type LS 4 - LS 12
- 40 pin for power components type LR 4 - LR 12
- For the 160/T12 respectively DL 12 one 20 pin and one 39 pin plug must be used

230V:

- 10 pin connector socket with cable for max. 5 runners (AG 5)
- 16 pin connector socket with cable for max. 8 runners (AG 8)
- 32 pin connector socket with cable for max. 15 runners (AG 16)

When ordering a power cable the following informations is required:

- Number of low voltage runners
- Number of 230V runners
- Type of low voltage connection (such as 20 pin 39 pin or for DL4, for DL8 or DL12)
- Type of 230V connections(10 pin, 16 pin or 32 pin) or (AG 5, AG 8, AG 16)

Hint:
To prevent connection errors between the temperature controller DPK and the power unit, the load connector of the DPK is mechanically coded. The power cables should be equipped with the same encoder system as the DPK.
This applies only for units using a star net supply (see apendix C).
You can also order cables for connecting several low power units to a DPK (e.g. connection for 2 x DL8 or 3 x DL4 etc.)

Signal Inputs and Outputs of the DPK

Output Fault (Def.)

If a thermocouple or heating circuit failure is detected, it will be reported here.The output ´Defect´(= fault) is a potential free normaly open contact for 230V~ (max. 1A) or a protected extra low potential as specified by VDE (VDE = ´union of german electrical engineering´). The contact must be fused externally. A corresponding plug with 2,5m cable can be ordered from the GÜNTHER HOT RUNNER SYSTEMS company.

Output Ready to Start Molding (OK)

As soon as the adjusted runners have reached the preset temperatures the output „Ready to start molding operation" is switched on. Additionally a potential free relay contact „OK" for 230V~ (max. 1A) is switched on. A corresponding plug with 2,5m cable can be ordered from the GÜNTHER HOT RUNNER SYSTEMS company.

Input Lowering (Abs.)

By using potential-free external contact, the DPK can be set to lowering.

Hint:
Attention: Never connect any voltage to this input!

Serial Interface

One serial interface (RS232) is included in every DPK.
For a connection to a molding machine a second serial interface is required. Depending on the molding machine and its protocol a RS232, RS 485, RS422 or TTY- (current loop) interface is required. You can get this interface as an add on kit or from the manufacturer installed when ordering a new DPK. For further information please contact Günther Hot Runner Systems.

6.1.3 Additional Interface

The add on kit includes:

- 1 interface module
- 1 preassembled flatcable
- 5 m interface cable 2 x 0.5 mm² shielded, assembled for connection to the molding machine Arburg, Engel or Krauss - Maffei (please note the type at your order).
- 2 pcs. spacer bolts including nut

Installation:

Hint:
Attention: Disconnect main power before opening system!

- Remove the top cover by removing the four screws on the side of the unit.
- Plug the interface into the 10 pin an 14 pin conectors on the front panel (LR27) **(take caution of the right direction!).**
- Remover the cover panel at the rear side of the DPK.
- Pull the pole connector with its flat cable through the opening of the unit and connect the D-SUB 9 pin connector by using the spacer bolts and nuts from the outside of the unit.
- Plug the flat cable onto the interface module **(take caution of the direction!).**

Attention:
Check the polarity! Pin 1 of the PCD must correspond to pin 1 of the socket!

- Check the right jumper settings
- Close the top cover and fix it by using the srews.
- Install the cable to the molding machine, connect it on both sides and fix the screws of the connectors.
- Setup the right protocol type in the DPK.

Fig. 6-1 Interface Connections of the DPK
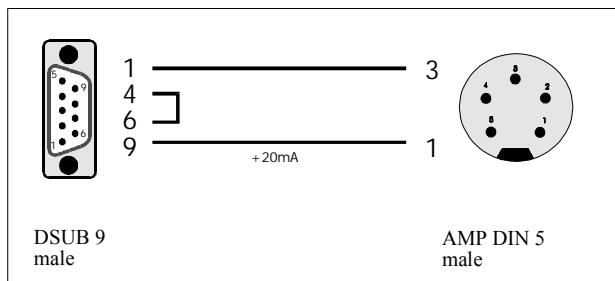
Fig. 6-2 Wire Connection ARBURG
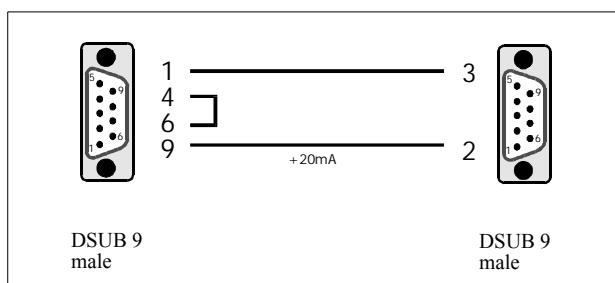
Fig. 6-3 Wire Connection ARBURG
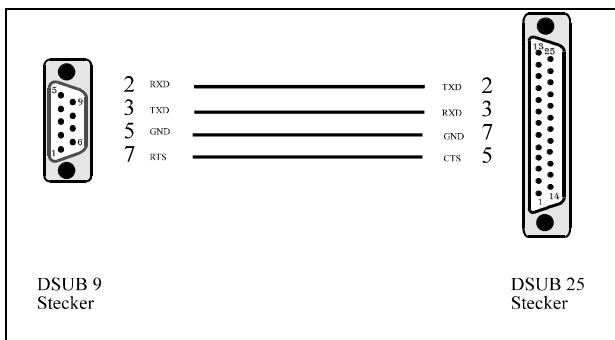
Fig. 6-4 Wire Connection KRAUSS - MAFFEI
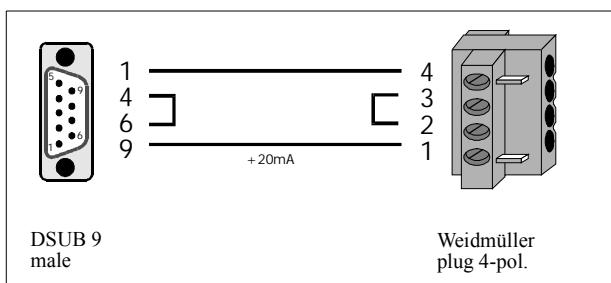
Fig. 6-5 Wire Connection ENGEL

Hint:
If an EPROM update is required at the same time of the interface installation, disconnect the molding machine from the DPK before switching on.

At the order of an interface, please note the type of the interface!

Technical Data (Optional Interface):

Signal type	RS232 level, TTY level (20mA current loop) optional: RS485 level, RS422 level,
Dataformat	2 x asynchronous full duplex
Baudrate	max. 19200 Baud
Cable length	max. 15m for RS232; max. 300m for TTY (cable cross section 0,4mm²); max. 1000m for RS422 and RS485
Isolation	5kV (Input / Output)

6.2 Initial Start-Up

6.2.1 Testing Thermocouple Connections

- Install the device refering to **chapter 6.1 Installation.** Disconnect the power connector!
- Turn on the DPK. The DPK now shows the software version (e.g. P1.09) and begins to check the the hot runners. Then the error message „check load-connector" is displayed.
- Change the parallel display to the set values by using the „ ▲ " key.
- Make sure to set all channels to the regulating mode.
- Switch the parallel display to the exist values.
- Now all connected channels must show a temperature value. Otherwise the channels not working right have to be checked.
- If the display only show maximum temperatures between 20°C and 40°C, then the blue and red cables of the thermocoples are expected to be exchanged.

6.2.2 Testing Heater Disconnections

- Switch off unused channels.
- Set all channels to 0°C or 0% at disconnected load connector.
- Connect the load connector.
- After turning the device off and on there should be no „load circuit interupted" messages.
- If there is any fault, the corresponding channel will be displayed.
- For further testing the damaged channel should be switched off.

6.2.3 Testing Thermocouple and Load Crosswiring

- Set all channels to regulating mode and set a temperature value of 0°C.
- Switch off unused channels to get no error messages from them.
- Now no error messages should be displayed.
- Set the parallel display to the existing values.
- Set the first channel to 100°C and watch at the parallel display. The temperature of the corresponding channel should increase now. If the temperature of another channel increases faster, there is an error in the connection.
- Set the channel to 0°C again.
- Now test the next channel.

6.2.4 Additional Information:

Hint:
When working with the 230V loads, switch off the DPK and disconnect it from the power source!

Opposite of other regulating units for 230V, the DPK checks the loads at the power up precedure by using a current measurement. So a clear statement about a load disconnection could be given.

For all channels the set value in ampere can be displayed.

To check the heater current a clamp-ampmeter with true RMS measurement should be used. For low voltage nozzles a range of 0-150A is required. High voltage nozzles requires a range of 0-10A.

If there are problems with the installation of the DPK, please contact our service department for help. Please use the service form in **appendix E** and send it to the next service department.

6.3 Installing new EPROM updates

Hint:
Attention: Disconnect the mains voltage and take care that there is no voltage at the DPK before opening the device!
Please follow the safety instructions!

To install a software update disconnect the power and thermocouple connections from the DPK. Disconnect also the serial interface to a molding machine.

Now remove the top cover of the DPK and get the EPROM out of the module LR28. When installing the new EPROM take care of the right direction and fit in socket of the circuit.
After that get the EPROM out of the module LR27. When installing the new EPROM take also care of the right direction and fit in socket of the circuit.
Following this step close the cover of the DPK.

Attention!
Do never exchage the EPROMs!

After turning on the DPK again, the DPK performs an update and an adjustment.
Now the DPK should work normally.
The actual software version is displayed in the right lower edge of the display, when the DPK is turned on.

7 Appendix
7.1 Appendix A – Connections to the DPK
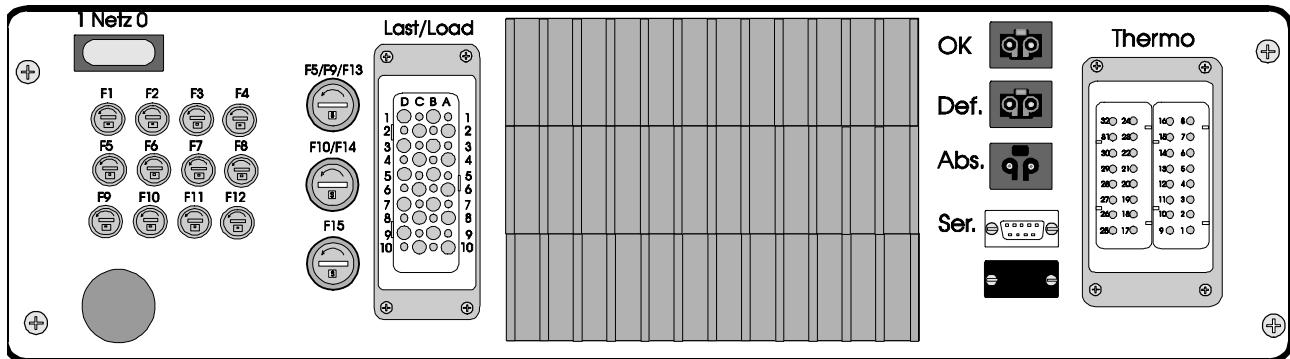
Fig. 7-1 Connections on the Rear Side of the DPK

Ser.: Serial Interface,   OK: Ready to Start Molding
Def.: Fault,   Abs.: Lowering external

Channel:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Metal / + / red	1	2	3	4	5	6	7	8	17	18	19	20	21	22	23
Constantan / - / blue	9	10	11	12	13	14	15	16	25	26	27	28	29	30	31

Fig. 7-2 Thermocouple Connector (32 pin) to the DPK

Channel:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
External Conductor:	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3
Transducer:	A7	A8	A9	A10	B7	B8	B9	B10	C7	C8	C9	C10	D4	D5	D6
Transducer:	D7	D8	D9	D10	D7	D8	D9	D10	D7	D8	D9	D10	D7	D8	D9
Neutral Conductor:	A5	A5	A6	A6	B5	B5	B6	B6	C5	C5	C6	C6	A6	B6	C6

Fig. 7-3 Load Connector (40 pin) of the DPK15

Channel:	1	2	3	4	5	6	7	8	9	10				
External Conductor:	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2				
Transducer:	A7	A8	A9	A10	B7	B8	B9	B10	C7	C8				
Transducer:	D7	D8	D9	D10	D7	D8	D9	D10	D7	D8				
Neutral Conductor:	A5	A5	A6	A6	B5	B5	B6	B6	A6	B6				

Fig. 7-4 Load Connector (40 pin) of the DPK10

Channel:	1	2	3	4	5									
External Conductor:	A1	A2	A3	A4	B1									
Transducer:	A7	A8	A9	A10	B7									
Transducer:	D7	D8	D9	D10	D7									
Neutral Conductor:	A5	A5	A6	A6	A6									

Fig. 7-5 Load Connector (40 pin) of the DPK5

Hint:

In star circuit the return cables A5, A6, B5, B6, C5 und C6 only connected to the neutral conductor. In the case of delta connection one does not mean an neutral conductor, but another external conductor (phase).
The connection position for special appliance (revision S) is different from the shown.
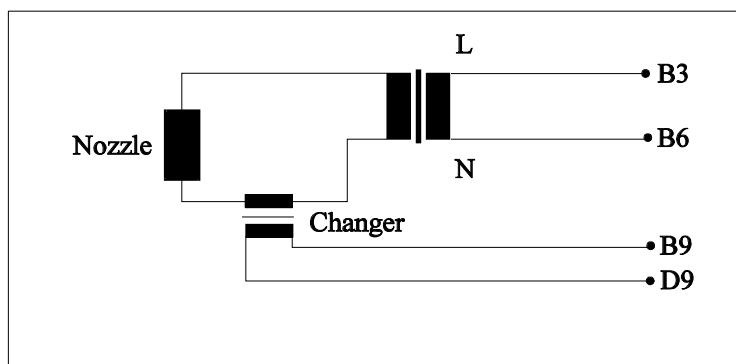
Fig. 7-6 Connection Example: Controller Runner A7 of the DPK10

Hint:

The load plug is different from the DPK15 corresponding to the appliance. Please take care of the corresponding table. (Fig. 7-3 to 7-5).

7.2 Appendix B - Fuses

Fuse Location for the DPK:

The up to 15 heating zones are fuse protected by super fast microfuses. At the DPK15 all of the load fuses are located on the back side of the controller.

Note that you have to switch off the controller before changing any fuse!

<u>Hint:</u>
Use only original fuses with the corresponding specifications. One package of original reserve fuses has been enclosed with the DPK.
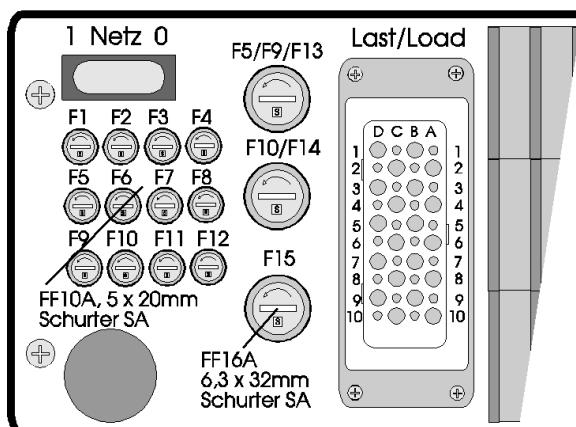
Fig. 7-7 Position of the Load Fuses of the DPK

The figure shows a part of the DPK's back plate. The 15 fuses for all heating zones are placed on the left housing side. The three 16A fuse holders are mechanically different from the 10A holders. The fuse number correspond to the zone number.

<u>Hint:</u>
Please note, that the DPK can be delivered as 5, 10 or 15 channel system. The lettering of both upper 16A fuses have ambiguous meanings.

The controller DPK5 contains four 10A-fuses for the zones 1 - 4 and one 16A-fuse for the zone 5.
The controller DPK10 contains eight 10A-fuses for the zones 1 - 8 and two 16A-fuse for the zones 9 and 10.
The controller DPK15 contains 12 10A-fuses for the zones 1 - 12 and three 16A-fuse for the zones 13,14 and 15.

Additionally to the heating zone fuses, the DPK contains up to four internal controller fuses. The main controller fuse for the major electronics is placed on the main board LR28 and has a nominal value of 160mA (T). Each of the power moduls LR15 is has a separate 160mA controller fuse.

Power Module „LR15"

The phase control in the DPK is realized with the thyristor module LR 15.

Depending on the model there are 1-3 modules inside of each DPK.

Every module is driven by its own phase. Channel 1-5 by L1, channel 6-10 by L2 and channel 11-15 by L3.

On the LR 15 there are two jumpers for the channel setting. They have to be set like the figure shows.

The DPK checks the thyristors of each power module at every adjustment. In case of an error the corresponding phase of the module is displayed with an error massage. The damaged module can be easy locted by measuring the phase.

Attention!
Attention: Disconnect the mains voltage and take care that there is no voltage at the DPK before opening the device!
Please following these safety instructions!
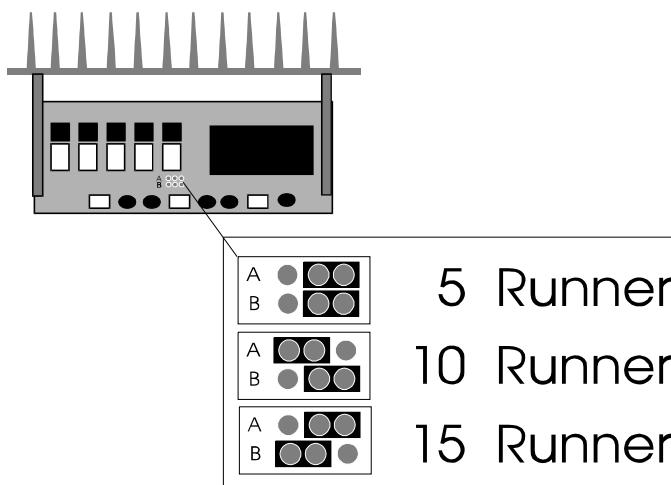
Fig. 7-8 Jumper Settings for the Power Module LR 15

7.3 Appendix C – Star-/Delta Opperation

Hint:
Attention!
Disconnect the mains voltage and take care that there is no voltage at the DPK before opening the device!
Please following these safety instructions!

The unit DPK is prepared for a standard connection of a 400V star net supply. In case a 240V delta net supply is necessary (for example USA), this can be adapted by using four screwbridges.

Disassemble the unit cover. Connect bridges as shown in the diagrams below.
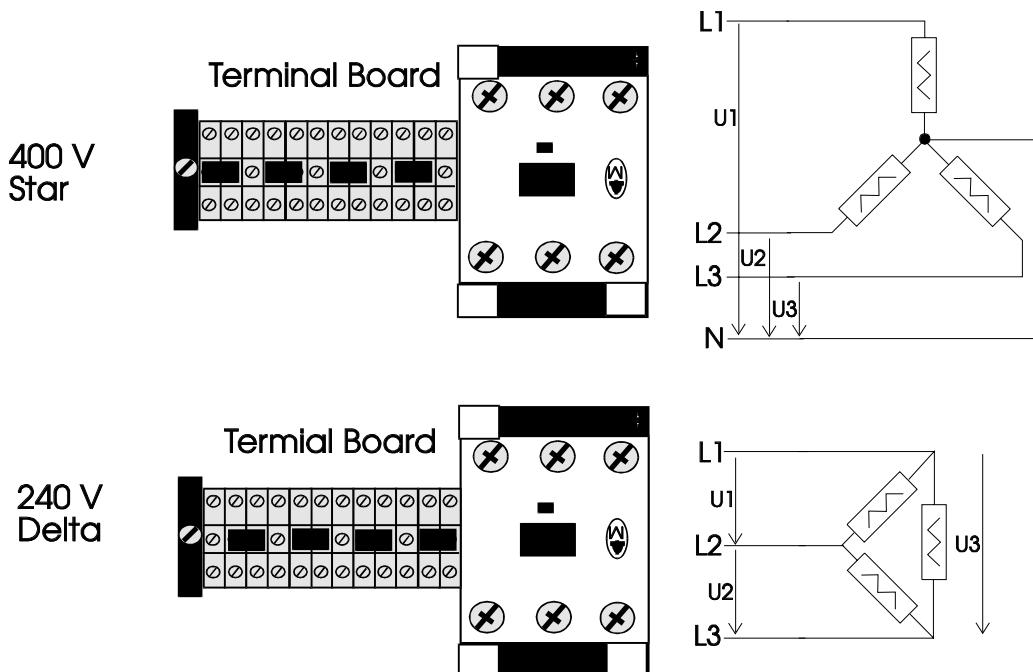
*Fig. 7-9 Star- / Delta – Switch Over (**U1=U2=U3=200V-250V !!!**)*

Close the cover!

Attention !!
The voltages U1, U2 und U3 must be within a range of 200V-250V!
If the unit is powered with other voltages the warranty expires and in some cases the unit can be damaged.
When using a Delta-net supply the cable is not compatible for the different versions. That means that the DPK 5 should only be used with a cable intended for a five hot runner unit. The use of a cable designed for a 10 or 15 hot runner unit will lead to operations errors.

7.4 Appendix D – Technical Data

Connection Specifications:

Terminal Voltages: 200-250 V AC per phase, 50 to 60Hz, typ. star connection

Star Connection: 3-phase-supply with neutral, 200-250 V between phase and neutral

Delta Connection: 3-phase-supply without neutral, 200-250 V between two phases

Load Connection: 10A per channel (fuse 10A super fast= FF 10A) 1 runner
per phase 16A. (see max. current of phase !)
phase load (5 channels per phase): <u>max. 25A</u>

Maximum Power:

DPK 5: phase L1: channel 1 - 4 = je 2,3 KW (10A)
channel 5 = 3,6 KW (16A)
max. overall load (CE): = 3,6 KW (16A)

DPK 10: phase L1: channel 1 - 4 = je 2,3 KW (10A)
channel 9 = 3,6 KW (16A)
phase L2: channel 5 - 8 = je 2,3 KW (10A)
channel 10 = 3,6 KW (16A)
max. overall load (CE): = 7,2 KW (2x 16A)

DPK 15: phase L1: channel 1 - 4 = je 2,3 KW (10A)
channel 13 = 3,6 KW (16A)
phase L2: channel 5 - 8 = je 2,3 KW (10A)
channel 14 = 3,6 KW (16A)
phase L3: channel 9 - 12 = je 2,3 KW (10A)
channel 14 = 3,6 KW (16A)
max. overall load (CE): = 10,8 KW (3x16A)

(see also apendix A)
5V / 120A per channel using our power units
24V / 25A per channel using our power units

Load Type: ohmic and inductive ohmic loads are allowed

Thermocouple: thermoelectric couple Typ L (FeCuNi) (electronic compensation)

Error Output: potential free contact, normaly open (max. 230V/1A, unfused)

OK Output: potential free contact, normaly open (max. 230V/1A, unfused)

Lowering Input: connect a potential free contact, normaly open

Net Cable: 32A CEE plug (standard)

Sockets: Load connector: 40 pin Amphenol
                           Thermocouple connector: 32 pin Amphenol

Fuses:

Triac unit:
- Microfuse FF 10A, 5 x 20mm, type Schurter SA, super fast for Triacs (4 pcs. per module LR15)
- Microfuse FF 16A, 6.3 x 32mm, type Schurter SA, (1 pcs. per module separated on the back side of the device)

Ser. Interface: RS232, TTY, (RS422, RS485)
At the moment protocols are availible for Arburg, Mannesmann, Krauss - Maffei and Engel. Further protocols are planed (e.g. SPI, EURO-MAP17, CAN BUS – please call us).

Regulator: PID, adjustable from the front
parameters are programmable and can be locked

Load Matching: automatic recognition of 230V and low voltage loads with
automatic adjustment of the control parameters

Output: uniform automatic parameter match by means of phase control mechanism

Control Range: 0 to 500°C / 0 to 932°F

Set Range: 0 to 100%

Softstart: 3-phases
                          1. adjustable ramp on 50% of the set value
                          2. heat up to 105°C
                          3. adjustable hold time on 105°C

Starting Ramp: Equal heating of each nozzle depending on the slowest nozzle

Lowering: adjustable 0 - 255°C / 0 - 255°F

Boost: adjustable 0 - 255°C / 0 - 255°F

Security Turn Off: adjustable 0 - 500°C / 0 - 500°F

Other Details:

Data Protection: Data recovery after power fail, data storage lifetime at least 10 years
(without battery)

Display: Operating section: LCD graphic display 40 x 71 mm
Parallel display: seven segment LED display 8mm and LEDs

Keyboard: Front panel with integrated mechanical keys and key foil

Storage Temp.:   0 to 70°C

Operating Temp.:   0 to 35°C

Humidity: Storage: 30% - 80%, not condensing
Operation: 40% - 70%, not condensing

Protection Type: IP 20

Dimensions: (W, H, D) 468mm x 142mm x 345mm

Weight: 13,0 Kg (28.6 lbs)

Color: grey / blue (RAL 9018 / RAL 5015)

7.5 Appendix E - Service Form

(Addresses: see **Apendix H - Addresses**)

FAX

To:	**From:**
Company:	Company:
Phone:	Phone:
FAX:	FAX:
City:	City:
Date:	Date:
	Response partner:

! Please call back	! Ask for customer service	! Ask for repair	! Other

Service-form for control units from the Günther Hot Runner Sytems company

Type of unit:
Serial number:
Program version:
Used connecting cable:
Voltage:

Net kind: ! Star   ! Delta   ! Other

5V   :   Runners...
24V :   Runners...
230V: Runners...

If power units (5V / 24V) are used, are collective rails connected?

Description of previous history (initial start up, prior operation, etc.)

Problem description:

Other:

Notes:

7.6 Appendix F – Schematic
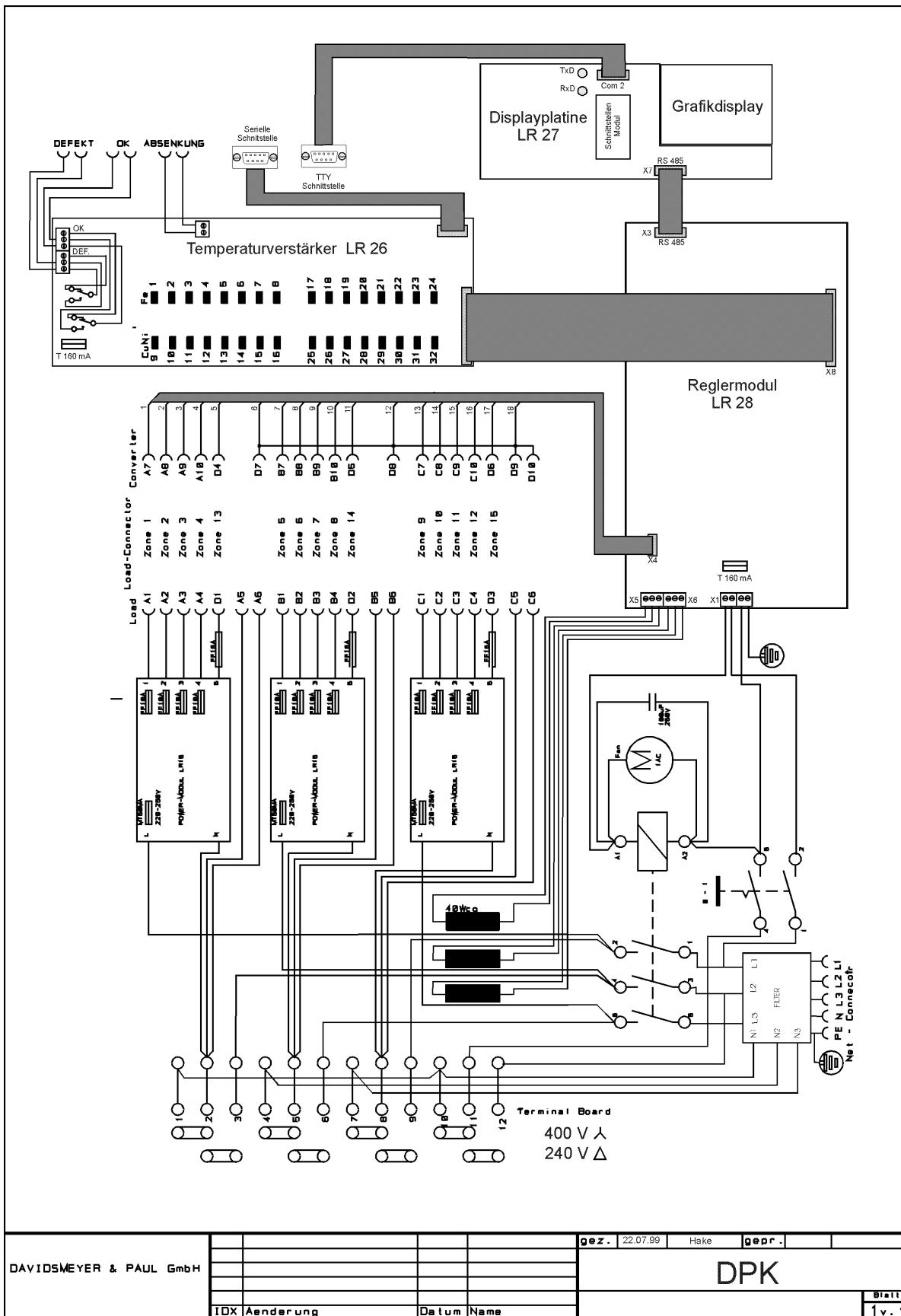
7.7 Appendix G – Position Schematic

LR 26

X3

X4-X6

1 2

M1

LR 27

LR 28

Mic

5 4

5 4

5 4

3 2

3 2

3 2

L

L

L

X1

b   a

1
2
3
4
5
6
7
8
9
10
11
12

LR 15/1

LR 15/2

LR 15/3

1N

1N

1N

Mic

Mic

Mic

A2/1   5   6   A2/2

3   4

K1

A1   1   2

LR 30

Front

PE11

Z1-Z3

2N   1N

F1, Z3, X4, PE8 oben
F2, Z2, X5, PE9 mitte
F3, Z1, X6, PE10 unten

PE6-PE10

PE5

X2

PE12

F1 - F3

S1

1

1 2

2L   1L

Deckel   Boden

PE4   PE3

PE2   PE1

DAVIDSMEYER & PAUL GmbH

		gez.	Hake	23.07.99	gepr.	

Positionsplan

Typ: DPK

Blatt
1v.1

IDX | Aenderung | Datum | Name

7.8 Appendix H - Addresses

<u>Headquarter:</u>

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Rua Joao de Barro, 52	E-mail	brale@brale.com.br
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CAN-St-Laurent, QC H4S 1V8		

Davidsmeyer & Paul GmbH

7.9 Apendix I – EG Declaration of Conformity

For the following below listed products:

Günther-Hot Runner Controller DPK

we hereby confirm, that above listed products comply to all important (*) safety requirements that have been declared by the Council of Assimilation of Legal Regulations by the EC membership countries concerning electromagnetical conformity.

89/336/EWG EMV
73/23/EWG Low Voltage Requirements

To verify these products to electromagnetical conformity the following standards were referred to:

EN 50081, Part 2
EN 50082, Part 2

The above mentioned products also comply to:

DIN EN 61010, Teil 1/03.94.

This declaration applies to all above listed products with the folowing production index:

Production Index D and E

The production index is the number behind the serial number on the identification label of the product. The identification label is located on the right side of the product.

DAVIDSMEYER & PAUL GmbH Elektronik
Humboldtstr.2-4
D-50181 Bedburg

Bedburg, 01.08.1999

J. Marquardt
(Managing Director)

(*) Expressions recommended by "EMV-Rechtsvorschriften und ihre Anwendung in der Praxis", Franzis-Verlag, 1993